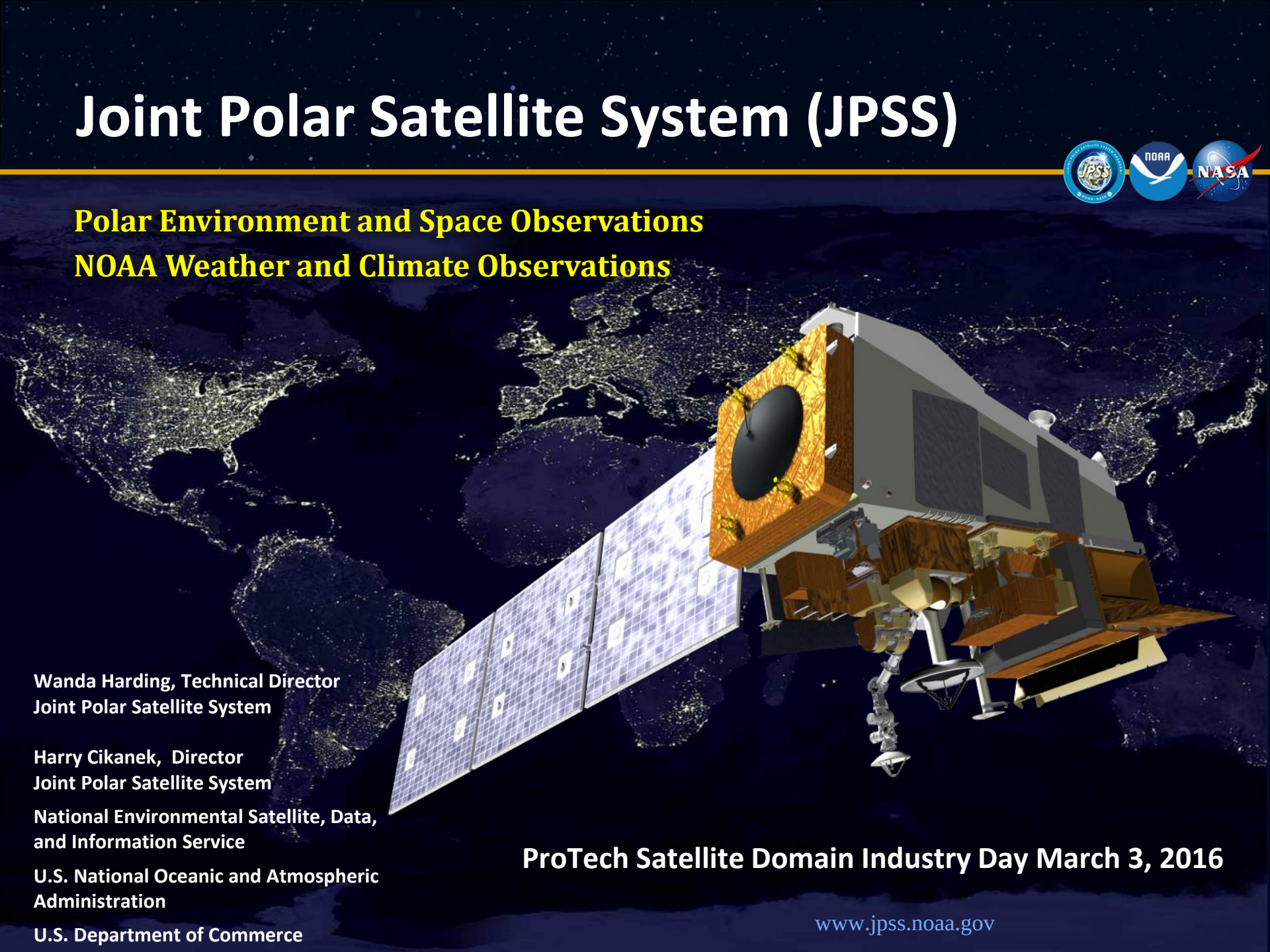
Joint Polar Satellite System (JPSS)

Polar Environment and Space Observations
NOAA Weather and Climate Observations



Wanda Harding, Technical Director
Joint Polar Satellite System

Harry Cikanek, Director
Joint Polar Satellite System

National Environmental Satellite, Data, and Information Service

U.S. National Oceanic and Atmospheric Administration

U.S. Department of Commerce

ProTech Satellite Domain Industry Day March 3, 2016

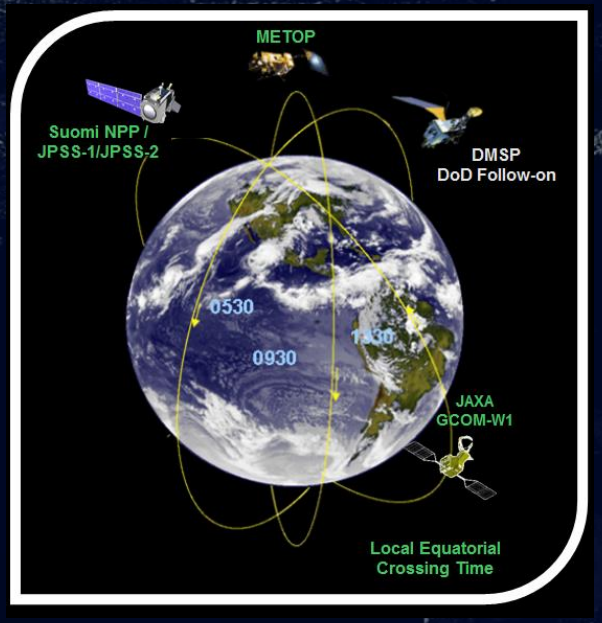
www.jpss.noaa.gov

NOAA's Mission

NESDIS Vision: To expand understanding of our dynamic planet as a trusted source of environmental data

JPSS Overview

- JPSS is the next generation of U.S. civil operational polar-orbiting satellites.
- The JPSS Program is led by NOAA, implemented with NASA, and includes agreements with EUMETSAT, JAXA and DoD.
- JPSS provides operational continuity of satellite-based observations and products beyond NOAA Polar-orbiting satellites and NASA Earth-observing satellites.
- The JPSS program is on budget and on schedule to launch the next satellite, JPSS-1, in 2017.



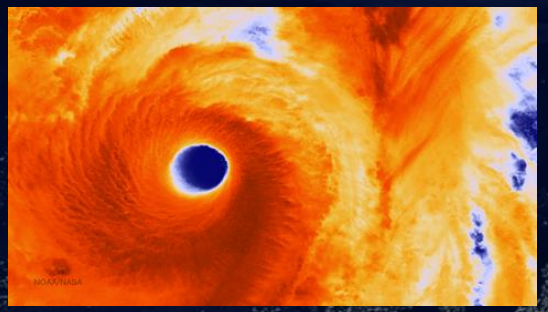
JPSS Provides…

…the most critical data for numerical weather prediction to enable accurate 3-7 day ahead forecasts, giving high confidence to emergency managers in advance of severe weather events

…operational weather and environment satellite observations for Alaska and Polar Regions operational forecasting

…global coverage and unique day and night imaging capabilities in support of broad environmental monitoring and forecasting needs

Without JPSS, the U.S. would experience an immediate degradation in weather forecasting capability



October 2014 - Vongfong IR

March 2015 - ice congests Chesapeake Bay

May 2013 - Tropical Cyclone Mahasen

JPSS System Architecture

Data access through:

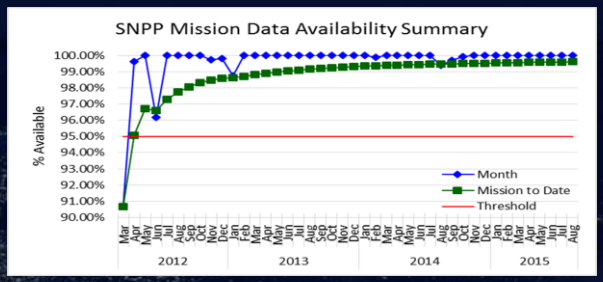
- NOAA Archive;
- Direct Readout; and
- Approved Real-time Subscriptions

- Svalbard, Norway
- Fairbanks, Alaska
- TDRS - Tracking and Data Relay Service, New Mexico
- McMurdo - U.S. Antarctic Research Station
- NSOF - NOAA Satellite Operations Facility
- NWS - National Weather Service
- NOS - National Ocean Service

Mission Status

S-NPP

- 4 years on orbit as of Oct. 28, 2015
- Rapid data product transition to operational use
- Primary for weather since 1 MAY 2014
- Excellent health and data availability



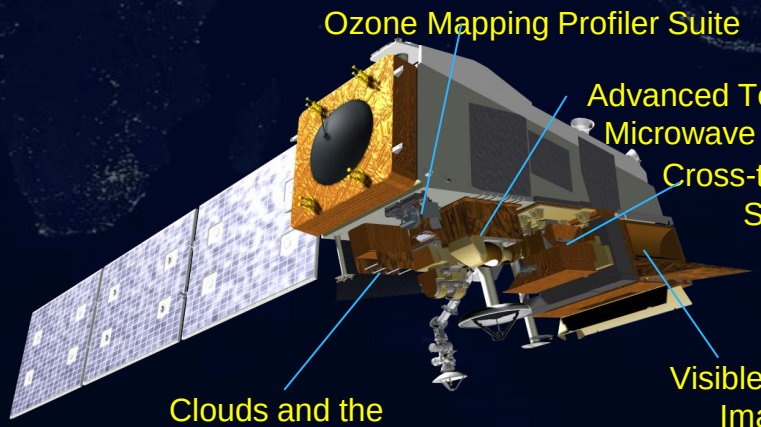
JPSS-1

- Integrated satellite in test phase
- On track for early 2017 launch

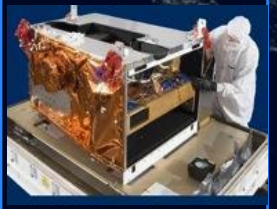
JPSS-2

- Instrument parts/assembly phase
- Spacecraft kick-off phase

JPSS-1 Spacecraft

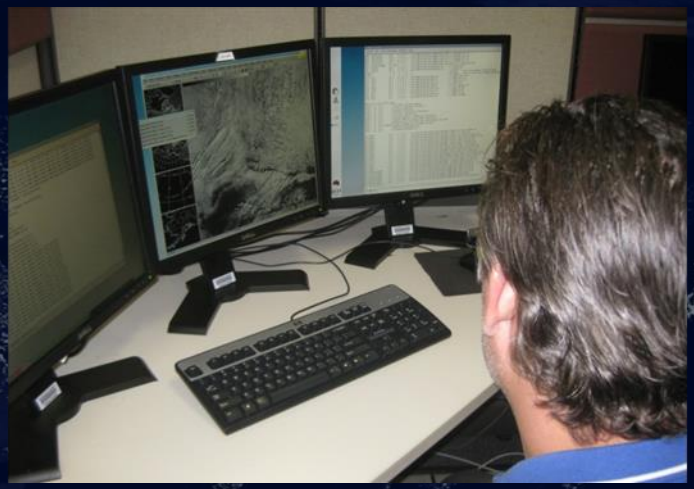


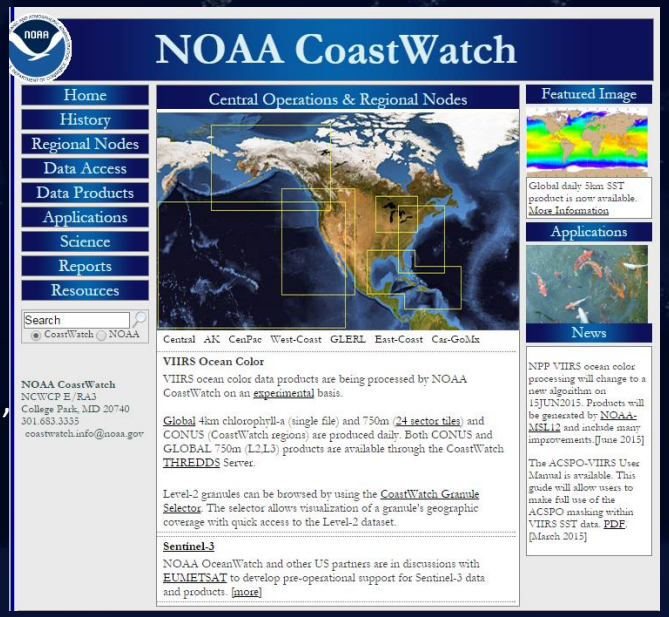
JPSS Instruments

JPSS Instruments		Measurements
	**ATMS** - Advanced Technology Microwave Sounder	ATMS and CrIS together provide high vertical resolution temperature and water vapor information needed to maintain and improve forecast skill out to 5 to 7 days in advance for extreme weather events, including hurricanes and severe weather outbreaks
	**CrIS** - Cross-track Infrared Sounder	
	**VIIRS** – Visible Infrared Imaging Radiometer Suite	VIIRS provides many critical imagery products including snow/ice cover, clouds, fog, aerosols, fire, smoke plumes, vegetation health, phytoplankton abundance/chlorophyll
	**OMPS** - Ozone Mapping and Profiler Suite	Ozone spectrometers for monitoring ozone hole and recovery of stratospheric ozone and for UV index forecasts
	**CERES** - Clouds and the Earth's Radiant Energy System	Scanning radiometer which supports studies of Earth Radiation Budget (ERB)

Operational Use of Suomi NPP Data (NOAA's Primary Satellite)

- NOAA real-time users of S-NPP/JPSS includes:
  - National Weather Service
    - ATMS and CrIS for weather forecasts
    - VIIRS nowcasting imagery and products
    - VIIRS environmental products for modeling and assessments
    - OMPS ozone for ozone monitoring and UV forecasts
  - National Ocean Service
    - Coastal Water Quality/Harmful Algal Bloom alerts
  - National Marine Fisheries Service
    - Marine Resources/Ecosystems
  - NOAA Satellite and Information Service
    - Hazard Mapping System (Fire, Volcanic Ash, Smoke, Precipitation, Spills)
    - COASTWATCH (ocean color products) for NOS and NMFS



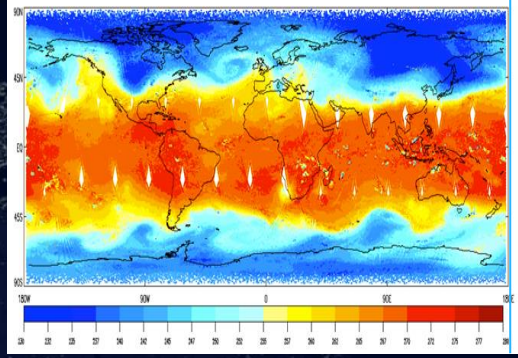


JPSS Applications Advancements

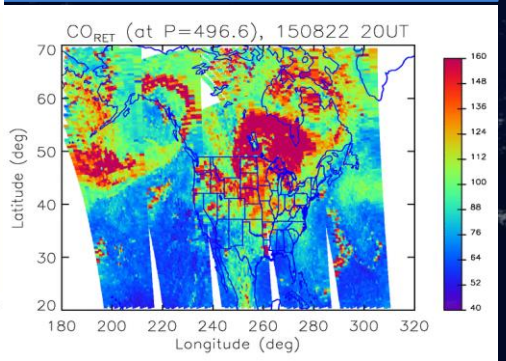
Sounding Products

- Demonstrations with operational forecasters
- Support storm watches and warnings
- CO product for tracking smoke emissions from forest fires

NUCAPS Temperature retrieval @ 500mb
(January 5th 2014 Polar Vortex Anomaly)

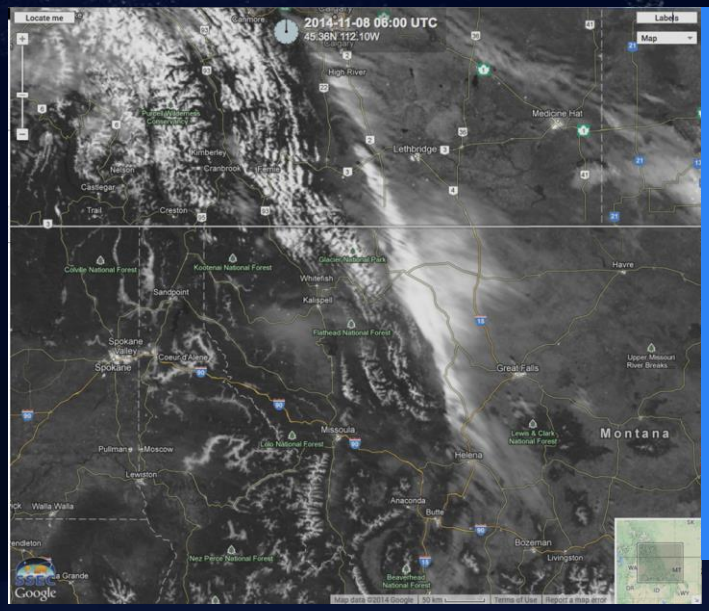


Carbon Monoxide @500mb
August 22, 2015



Day Night Band

- Sea Ice
- Storm tracking at night
- Ground Fog
- Active fires and smoke
- Socio / Economic / Impact assessment



Area Forecast Discussion
National Weather Service
Missoula MT
334 AM MST SAT NOV 8 2014

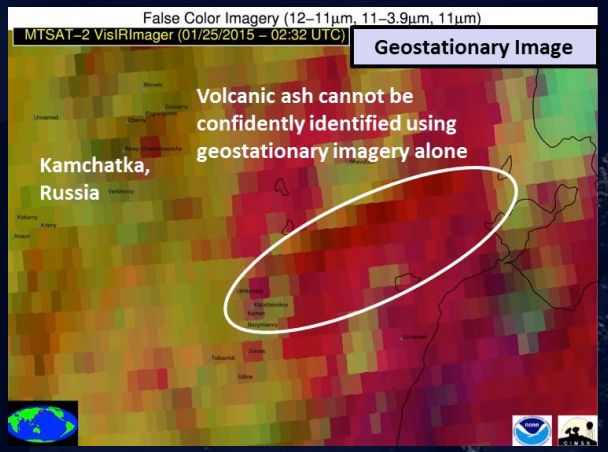
...

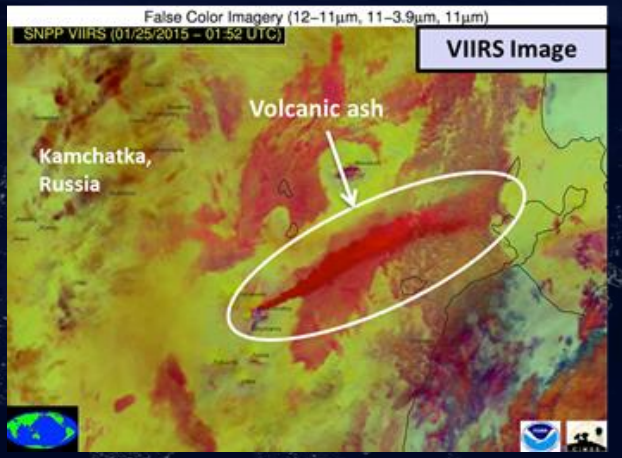
.AVIATION...Moderate high pressure situated over the area will bring a chance for fog to develop at KGPI, KMSO and KSMN. ***The VIIRS night-time visible satellite image at 08/1010z revealed some valley fog across Clearwater County, Idaho and also north across the Idaho Panhandle.*** Any fog that develops near the aforementioned terminals will dissipate by noon. Expect light and variable surface winds at all the terminals.

JPSS Applications Advancements

Volcanic Ash

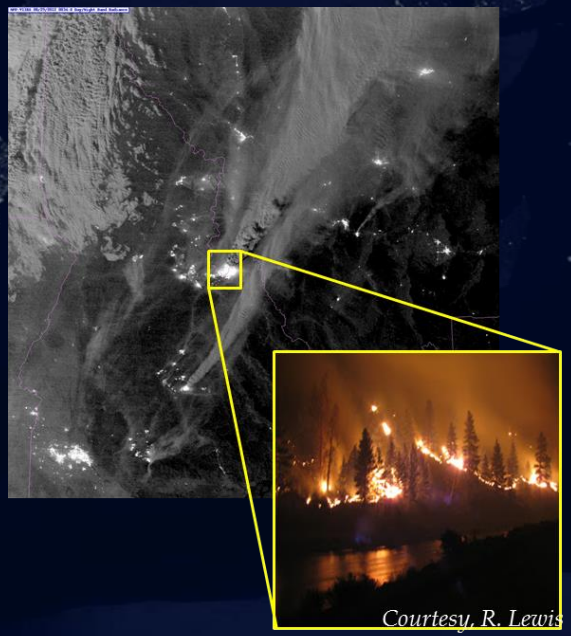
- Wide swath, near constant resolution
- More detections, better plume monitoring / predictions





Active Fires

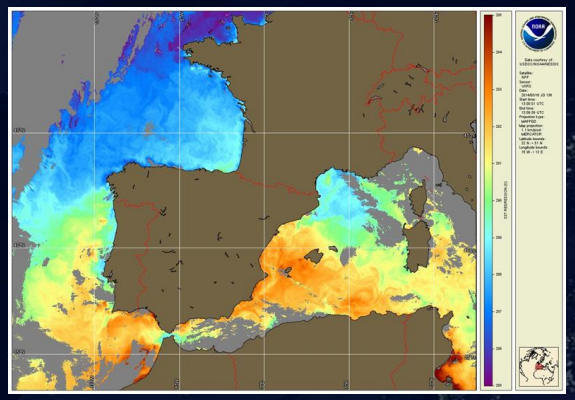
- Fire radiative power
- DNB tracking
- Improved visible resolution/ swath
- Successful field studies

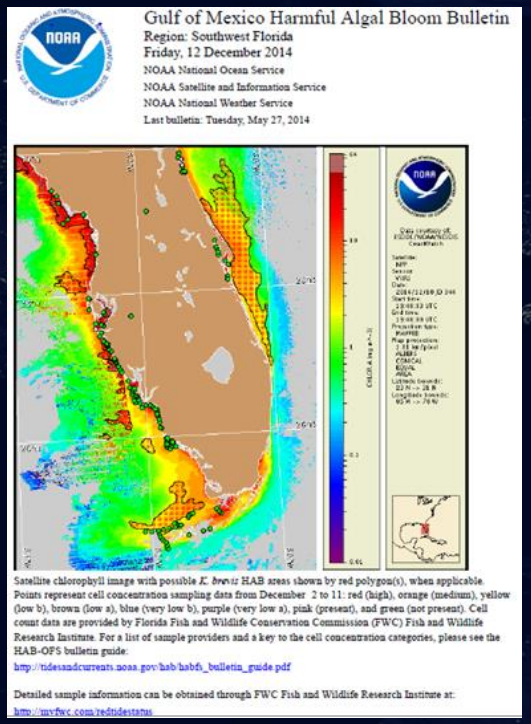


JPSS Applications Advancements

Oceanography

- Improved sea surface temperature
- Highly calibrated global ocean color



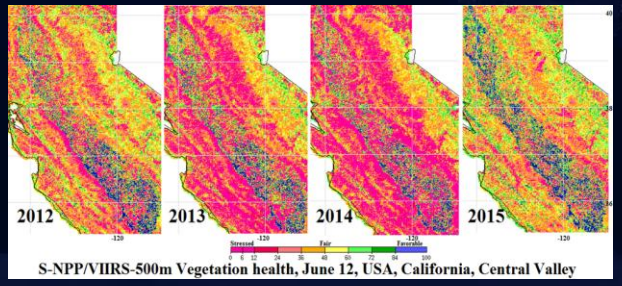


Hydrology

- Ice blockage
- Flood prediction / monitoring

Land

- Green Vegetation Fraction
- Vegetation Stress



Continuity of Observations

Polar Observations Criticality Increasing

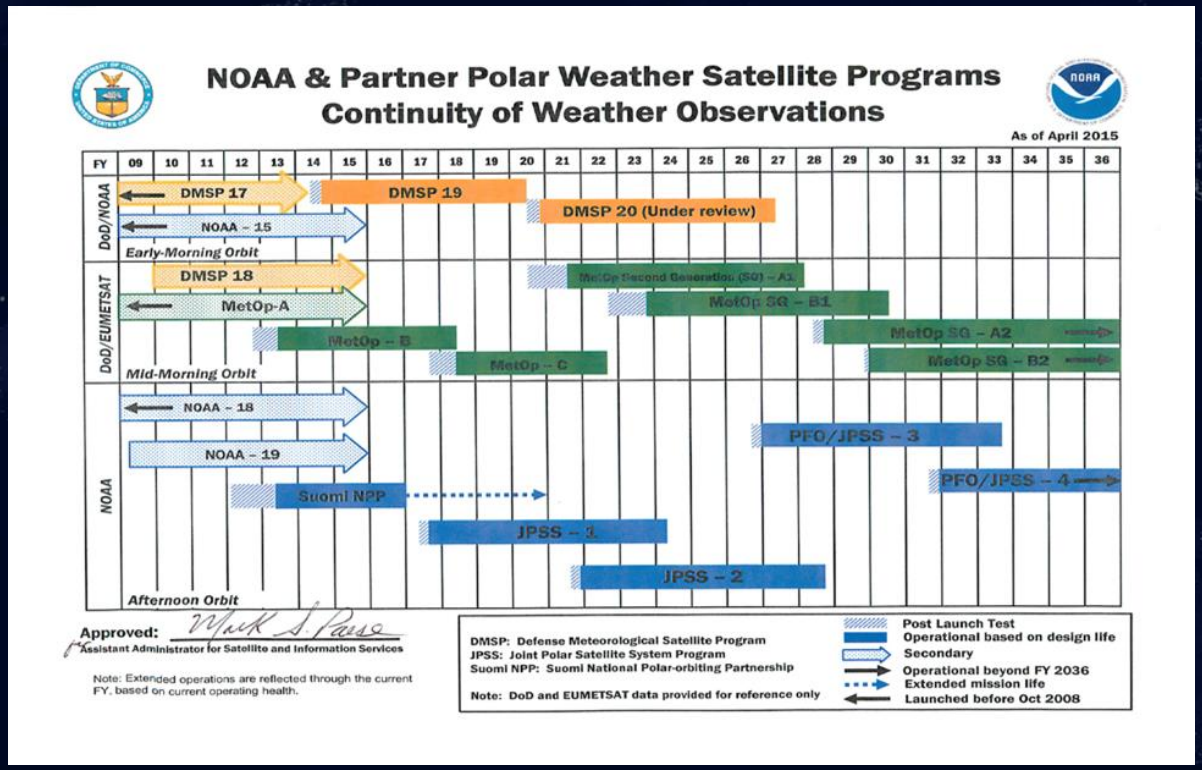
- Population and infrastructure increasing
- Dependency increasing

Mitigation

- Decrease impact
- Decrease likelihood

Polar Follow On+ Supplement

- JPSS-3 / JPSS-4 / EON
- COSMIC 2 / Other



Robustness

- No single failure causes loss of observations – on-orbit secondary
- Ensure replacement can be available in reasonable time – early readiness
- Achieves continuity with acceptable risk

NOAA JPSS Program Office (1/2)

Accountable for overall management and funding of all aspects associated with the development, deployment, and initial operations of the JPSS flight and ground assets, including operations, science, data exploitation, archiving, and infrastructure.

- Program and Project Management
  - Program controls (requirements, configuration management, budget, schedule, risk)
  - Performance, schedule , and cost baseline development and management
- Budget and Financial Management Support
  - Program budget formulation
  - Financial and cost estimating
  - Program budget execution
- Outreach
  - External communications and outreach
  - Conferences and workshops

NOAA JPSS Program Office (2/2)

- Administrative Support
  - Human capital
  - Office and facility management support
  - Records management
  - Property management
- Applied Research and Consulting
  - Scientific, engineering and technical expertise
- Studies, Analyses, and Reports
  - Special studies and trades
- Scientific and Technical Support
  - User readiness
  - Requirements definition

Summary

Substantial Progress in 5 years since program started

- Program Base-lined to Focus on Weather mission
- 5 instrument suite; S-NPP, JPSS-1, JPSS-2 Missions, Block 2 Ground development
- More than four years of S-NPP operations, observatory working well, excellent user feedback

Focus on Users

- Rapid user readiness, extensive calibration/ validation, risk reduction
- Increased performance

Plan for Continuity

- Impact Mitigations
- Robust plan
- Two new missions approved: PFO/ JPSS-3, JPSS-4

Thank You

www.jpss.noaa.gov